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# NEW GENERATION OF SCIENCE FOR VISUALLY IMPAIRED: ARTIFICIAL INTELLIGENCE

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## ABSTRACT

This paper approaches and discusses to the right of visually impaired and situation. Artificial intelligence helps to improve the teaching-learning processes of science for visually impaired. The ways of AI describes understanding the advantages for science classroom for Physics, biology and chemistry. Further, describe the recently develops artificial intelligence technique that is touch vision for Braille system users and others. This system uses (app detects the user's index finger location and different gestures performed by the user and renders audio information) and the seeing-AI fee of cost application software for image processing, text recognition from images from printed on paper, metals & non-metals and digital objects, deep learning, voice output, and voice recognition are performed through computer and phones for the visually impaired learner. A further area of research in science education through artificial Intelligence needs to be conducted is given. Suggestions put forth to make artificial intelligence more implementable and usable in science classroom.

**KEYWORDS:** Seeing-AI Touch-Vision, Brail, Visual impaired, Disable Rights.

**INTRODUCTION:**

Science is always giving new things and knowledge for consumers. In addition, human help and stick are only the tools were used for since birth to death of a visually impaired person. Visually impaired persons are eyesight that cannot be corrected to a normal level. Visually impaired always face difficulties to touch, see and learn things. To reduce these kinds of difficulties and serve the facilities to every suffer environment may research and development activities conduct from the year 1800s. After the long struggle Night Writing system concept introduced by Napoleon Bonaparte's French army officer Charles Barbier in the early 1800s for the secrete and safely communication during the night. But night writing system was not sufficient for the human fingertip and Louis Braille blinded at a very young age and born in the village of Couvra, France. Louis Braille did work hard to improve the drawbacks of occurred using the Night writing system. In the age of eleven Braille modify the Night writing system and in the year 1860 brail officially adopted in America. Further, the Braille system of touch reading and writing for blind persons in which raised dots represents the letters of the alphabet on paper or plastic sheets are used in every region of the world. Braille takes more times in learning the things and understanding the easily incompatible situation. Research and development activity in science gives birth to information communication technology (ICT). According to the National Focus group on Children with Special Needs (2006) , students can be benefits from adopted or alternatives activities, adapted equipment, and additional support of use of ICT in the teaching learning process that make accessible for those not accessible to them because of their impairment. Science in terms of ICTs provide a new platform for visually impaired in the 1950s is Artificial Intelligence (AI). Artificial Intelligence, the ability of a digital computer or digital device based on application software to perform tasks commonly associated with intelligent beings. AI makes the unseen, theoretical realm towards the educational and social practical world. This technique in terms of neural network discloses the world of visually impaired to think, to see and to utilize n appropriate infiltrated in education. Visually impaired people's educational needs tailored through AI for learning new languages and identifying and recognizing things. "Education must aim at giving the blind child a knowledge of the realities around him, the confidence to cope with these realities, and the feeling that he is recognized and accepted as an individual in his own right." –Berthold Lowenfeld. Rohman (2018) in the research study found that artificial intelligence helps to detect the deficit hyperactivity disorder in children. Jinnah says that People were more likely to give aims to a blind person. There was no awareness of the potentialities of such people and their need to be treated with dignity and respect. Government of India (2016) reform the initiatives for the people with disabilities like visual impairment have been provided with "the Rights of Persons with Disabilities Bill-2016 takes responsibilities to ensure that the persons with blindness or visual impairment enjoy their rights equally with an effective mechanism for ensuring their empowerment and true inclusion into the society is a satisfactory manner. Including the Artificial intelligence more and more visually impaired learner can be educated and self dependent.

**Artificial Intelligence: Ways to make education better:**

- ***Personalized Education:*** Learner can used to learn at own place removing the barrier of distance. There is no need depend on secondary assistance to read recognize things.
- ***Attention Span:*** It helps to make attention and increase the concentration on the objects in least time span.
- ***Differentiation and Individualized Shape:*** Artificial Intelligence can recognize the distance, shapes and colour of objects that is more informative.
- ***Detection of Text:*** Artificial Intelligence based software helps to capture the image and text. Further it read text and speaks and automatically converts into voice.
- ***Alarm for direction:*** It corrects the direction in real time access during the capturing text.
- ***Record and Reuse:*** Artificial Intelligence records the text, audio, voice, images and person and digitize automatic that can be use later multiple times accessible for education and information purpose by Visually Impaired.
- ***Automated Grading:*** It simulates the behaviour of an instructor, teacher, and guide to assign grades to written text

**AI in the Science Classroom:**

- ***In the Physics classroom:*** physics tools and kits are normally light indicators if in these tools and kits sensor for touch and sound added then visually impaired students also perform the experiments and get the desired knowledge. For example, in the Boolean gate kit for (AND, OR NOT gate) mostly light indicator is given, if the sensor to identify the input and output add then the kit will be more useful.
- ***In the Biology Classroom:*** students can access and use tactile items that were inbuilt with artificial intelligence. For example, students want to study human Skelton, with the help of touch, sound, and navigator details can be easy can be easily understood and gain knowledge of different sections with interest.
- ***In the chemistry classroom:*** students want to check the smell of compound or other things. Like heat indicator, smell indicator can be inbuilt in the items or different items can be placed on the artificial intelligence-based device that can identify the smell of individual item without keeping nose near to it.

There are following important Artificial Intelligence are recently develop and helpful for the visually impaired learners.

**Touch-Vision:**

Touch-Vision is an AI based technology used for the learning purpose by visually impaired learners. Its aims to create social impact by introducing affordable augmented reality based multimodal aids for children to assist them in perception and cognition development by sensitizing them about different concepts in their environment. The assistive devices line up comprises of affordable multisensory inclusive education aids, inclusive books, inclusive teaching aids and games. The work presented here mainly emphasizes on multisensory platform to be used in an inclusive school setup as well as an independent learning aid that enhances understanding through the use of a range of learning modalities namely visual, kinesthetic and auditory. It comprises of color tactile books, a foldable/portable stand and mobile application which enables audio interaction with the diagram.

It has been designed by innovators at IIT Delhi using a user centric participatory design approach with inputs from children between the age group of 6 to 15 years with/without disabilities and special educators. Tactile material is fixed at the bottom of the stand and mobile device is enclosed at the top of the stand to allow proper scanning. The app detects user's index finger location and different gestures performed by the user and renders audio information (Audio/TTS) accordingly. Once the user starts exploring the tactile diagram, the app simultaneously reads the label and description of the part of diagram which user is exploring. It also supports fast forward and rewind functionality through different gestures which enables independent learning as well provides assistance in differentiated instruction in inclusive classrooms. The product can be adapted as per the user's requirements and supports multiple languages to cater to different contexts and cultures. This enhances learning in a shared setup and enables peer to peer interaction among children regardless of their disability. The support for Q and A and other practical activities by the platform also enables discussion and assists teachers in providing an inclusive environment. Three categories of books, storybook reading series, map book and general learning series are available at present with this platform. User trials over the last two years have inferred that the system is useful and can be used by children themselves after providing them with operational training. In alignment with the UN's sustainable development goal no.4, Touch Vision focuses on the importance of inclusive education for a sustainable future. The goal is to leverage technology to build social capital to nurture a world of possibilities for people with disabilities.

**Inclusive education aid for schools:**
Classroom teaching Touch Vision can be used for classroom teaching in an inclusive setup for all the subjects as it offers flexibility to adapt any book. Diagrams and print text can be assisted through audio to enhance user understanding. In Biology class, if the teacher is explaining about plant cell, then the students can explore different parts of plant cell through respective audio label and gather information about particular feature through the description narrated through mobile application (Figure). This enables learning in a shared setup and enhances understanding. The teacher can explain the concepts to all the students in the class regardless of their disability in a regular classroom without giving any dedicated time/resource to children with disabilities. Differentiated instruction can also be supported by using Touch-Vision for regular classroom teaching as the children are free to learn according to their comfort and interest. The system supports three levels of description and fast forward and rewind functionality to facilitate differentiated instruction.

**Group activities:**
The support for Questions and Answer and other practical activities usually associated with chapters also enables discussion and assists teachers in providing an inclusive environment. It also facilitates evaluation by detecting user responses to questions and assigning appropriate marks.

**Supplementary Reading:**
In order to promote optimum participation of all children, including those with disabilities in the reading process and initiate reading in inclusive settings, Touch-Vision can be used to read moral stories and general books in the school library. This can promote development of reading skills among the students and encourage independent learning.

The other technology is boon for Visually Impaired Learner to make dreams come true without paying any cost is called Seeing- AI.

**Seeing-AI:**
Seeing-AI is the artificial intelligence based free application software designed to solve the real-life challenges for the visually impaired. Presently, it is most probably used software for visually impaired in the teaching-learning process. The components of this application software provide itself navigation to access and use of features. Seeing-AI app has valuable navigational channels such as reading text, Short Text, Documents, Products, labeling utilities, color, currency, Handwriting, scene, Light, Person and Obstacles recognition. It is designed by the popular software company named Microsoft in the year 2018 to help free those is a necessity.

**Availability of seeing-AI:**
Seeing- AI is iOS based software (Microsoft working on seeing-AI for usable in Android Phones). First, it can download freely from the Microsoft website: with a file size of 267.8 MB. It is work in one language only and currently used in 70 countries.

**Access and Use of Seeing-AI:**
The seeing-AI can be used for learning and identifying a purpose in the following areas such as

***Reading Text:*** It helps to capture the text from print or non-print material then convert into the digital format and automatically convert into the voice.

***Short- Text:*** There is no need to study full text. Only the selected and shorted area of text can be read through voice over method.

***Documents:*** multiple documents can scan and save for the present and future use viz., images of leaves, apparatus, books.

***Products:*** It recognizes the products by size and shapes and tells through automatic speaking.

***Person:*** It identifies the people height, color gesture and distance of people standing how much far away. Profile of the human save in the phone and can be used again for identification of anybody.

***Labeling Utilities:*** It captures the Barcode and read the details available on the bar code, which help to select the appropriate items and check their details like composition and weight

***Colour:*** Identification of color of items, things, an object is also unique features of seeing- AI

***Currency:*** It captures the image of different currency and shorts the details through camera Optical Character Reader (OCR) facilities and provides the text to voice service for its user.

***Handwriting:*** Including typed material, captured images, and identifies different writing styles. After identifying the handwriting, convert into audible form automatically.

Areas of Research needs in Science and Artificial intelligence for visually impaired Learners.

- Identification the description of apparatus used in the laboratory which helps in Science Education
- Identification and description of learning tools & Kits for Science (physics, biology and chemistry)
- Make cheaper and compatible devices for Learner
- Identification of sensitive thing like heat, temperature, and other accidental objects used in laboratories
- Working in the different Indian local language.

**SUGGESTIONS:**
1. Workshop and training programmes should be conduct for Researcher, Teachers, Teacher Educator, and those are affected from visually impairment.
2. For conveying of information about new technology and devices, door step services should be adopted through the government and non-government bodies for visually impaired.
3. Financial aid should be arranged and given for the visually impaired learners to purchase the learning tools specially for the science study.
4. More emphasize should be given on the research and development to reduce and remove the difficulties occurs in visually impaired.

**CONCLUSION:**
Advancement of science through Artificial Intelligence enhancing the expectations of real time access and use of different thing without losing the hope for visually impaired learners. This technology is ongoing process of science and technology that make more applicable with more than one language and application. This Artificial intelligence also integrates the perception to recognition different activities in same or varied environment. It also removes the psychological stress among the visually impaired, elder age persons and all those persons suffer from visual problems. Science itself emphasize on education for all with special needs like visually impaired students. Education known as the building blocks of human life, its helps to reduce the problems faced in daily life of school going children and community with participation and enjoying their activities. Therefore, science is the base of technology may in the form of Artificial Intelligence or through other application, makes well being for visually impaired life.

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